

ARCHITECTURE AND CONSTRUCTION**OPPORTUNITIES FOR URBAN AGRICULTURE IN MODERN CITIES****Veselin Rangelov**Associated Professor, PhD,
University of Forestry, Sofia, Bulgaria**DOI:** https://doi.org/10.31435/rsglobal_wos/30042020/7038**ARTICLE INFO****Received:** 09 February 2020**Accepted:** 10 April 2020**Published:** 30 April 2020**KEYWORDS**city,
agriculture,
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resources.**JEL:** Q01, Q24, Q50**ABSTRACT**

In recent years, urbanization has been on the rise at the expense of agricultural, forest and other natural areas. Due to the migration of the population to big cities, the number of people employed in the agricultural sector is decreasing and consumption is constantly increasing. The urban population is becoming more dependent, and the crisis in the sector is deepening. In recent years there has been intense talk of urban agriculture as an alternative to traditional farming. It has a number of positive aspects, but above all it enables the improvement of the environmental situation in cities, thanks to the increase of the biological mass in the urban environment, the creation of new jobs, the achievement of sustainability and socialization, not least reducing the value of the production produced.

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At present, 54% of the world's population lives in cities, while in the middle of the last century this percentage was only 30 (9). Today in Europe the urban population passes 70% and in Bulgaria it is about 74% (1). In recent years, urbanisation has risen at the expense of agricultural, forestry and other natural areas (4). Due to population migration to large cities, the number of people employed in the agricultural sector is decreasing and consumption is steadily increasing. The urban population is becoming increasingly dependent and the crisis in the sector is deepening. In recent years, there has been a hard talk about urban farming as an alternative to traditional. It has a number of positive aspects, but mostly it allows for improvement of the ecological environment in the cities, thanks to the increase of the organic mass in the urban environment, new jobs are created, sustainability and socialization is achieved, not least, reduces the value of production.

Urban farming can be considered a variety of classical plant production, although livestock farming in urban environments is also permissible. In this respect, it is necessary to clarify the meaning of this concept: on the one hand, it is an activity of growing cultural plants, an agricultural sector for the cultivation of cultural plants as a source of food products for humans and in animal husbandry, as a raw material in the sectors of industry – food, textile, chemical, etc., as well as for other purposes. On the other hand it is applied science, which studies the biology, scheme and agrotechnics of the cultural plants, their living environment and zoning, in order to obtain a constant high and benign yield from them at the lowest labor and material costs, a variety of varieties, hybrids, forms of cultural plants, better methods of cultivation, etc.

Of course, the concept of 'urban farming' is a significantly narrower meaning, which is confined mainly to the processing, cultivation and supply of food in urban areas. It is usually made for economic benefit or for private food production, although in many communities the emphasis is on

leisure, society and holidays. Urban farming attracts the urban population, as this often happens by renting relatively small plots of land usually in the outskirts of the city or neglected areas in the center, usually with the support state institutions, most often in the form of municipal programs.

Urban farming affects various aspects of urban life (5). It has:

Economic impact – urban farming in different countries (depending on country size, environmental conditions and subsidies) is an economic relief for the urban user. The reduced prices of transport, as well as the creation of additional vacancies in the city allow high-quality agricultural production at reasonable prices;

Social impacts – There are many benefits of urban agriculture in the social sphere, such as improving the network of social connections in the neighbourhood or in the community, a means of restoring difficult neighbourhoods or an educational system for children and young people;

Impact on the environment - urban agriculture reduces food mobility in remote areas. The importance for the environment is to reduce the amount of CO₂ emitted in the air. There are also saving food packaging. Combining these two elements reduces the ecological footprint.

Aesthetic impact – through the introduction of cultivated areas with different cultures (such as colors and color combinations) in the urban landscape is mitigated the boundary between the urbanized and natural environment. The smooth transition contributes to enhancing the visual sustainability of the landscape (10).

The small-scale heterogeneous pattern of traditional areas for urban (hobby) farming greatly supports the diversification of homogeneous modernist residential complexes – a method applied with success in many revitalization projects of these complexes – e.g. Square. Balimun, Dublin. 7

Urban farming is also in the main area of the Rurban (rural + urban) approach for the development of new urban areas (e.g. the Sociopolis Project, Valencia) (7)

Of course, all this is well known from the second half of the last century, when urban farming in Europe developed with varying success, initially in the years after the Second World War, and after a standstill-a new rise in 90, followed again by a smooth decline. What is new today is that the urban population globally grows at a breakneck pace. Agricultural resources are not reaching. This requires the active involvement of urban agriculture in the production capacity, but today, unlike the last century, do not reach urban terrains for this activity. A modern, rational approach is needed (11). The advantage of urban farming is that it can be developed in many respects. One of them is the use of non-traditional food production areas, such as abandoned enterprises in industrial areas of cities (12) or roof areas, facades, even suitable premises inside buildings known as "zero areas". These "zero areas" are lost spaces as a result of the build-up, in this case they can be approached rationally and they can be compensated by their recovery for agricultural needs, while with the biomass being realized it will be, albeit partly, reduced and the carbon footprint of the respective construction development.

Today with similar systems for green roofs, we can combine landscape architecture and exterior phytodesign with food production. The roof landscaping helps to reduce the temperature of the surfaces (6). Solar energy has the property to absorb and transform into heat. Depending on the color and texture of the surfaces on which the sun rays fall, they are heated to varying degrees. Concrete and asphalt have an unfavorable quality to heat up to 80 degrees, while the green foliage uses this energy as a building block and together with transpiration create a kind of microclimate that can reduce the annual temperature amplitudes between 2 and 4 degrees, and this in turn would optimise the energy efficiency of buildings, lowering their heating and ventilation costs.

On the zero areas can be grown any plants-ornamental, vegetable, fruit, arable, even technical crops, which depends on the construction possibilities of the buildings for the deployment of the respective green system. Vegetable crops are advantageous because of their short production cycle, high productivity per unit area and low cost of production. In addition, most vegetable crops develop a shallow root system, which allows their cultivation in containers or shallow beds, and permacultures and hydroponics do not even require soil substrate. This does not impose large costs in the construction of new buildings or the conversion of existing flat roofs.

Urban farming in its roof variant is fully in line with the three main aspects of sustainable development. Its objectives are educational, food, social and economic. There are a number of examples of roof farming around the world, such as bulk beds, containers and even greenhouses, are built on open roof areas and terraces. An example can be identified (7):

• Brooklyn Grange Rooftop Farm, located in New York City, is a farm on two covers with a total area of 10100 sq. m. From them, 20 tons of vegetables and spices are extracted annually. The production is directed to local restaurants, shops and markets. Besides production, the garden has an educational and social focus, and is open to anyone interested in urban farming, fig. 1.



Fig. 1. The Brooklyn Grandge Roof Farm in New York.

• Dakakker is located in Rotterdam and is now the largest roof farm in Europe. It is located on the roof of an office building and it is experimenting with different ways of producing food in urban conditions. For this purpose the surface of the roof is insulated and almost entirely saturated with soil substrate. Different fruits, vegetables, herbs, spices and even bees are grown. With this garden Rotterdam makes a step towards sustainable food production in urban conditions, improving the microclimate and living conditions for its citizens, fig. 2.

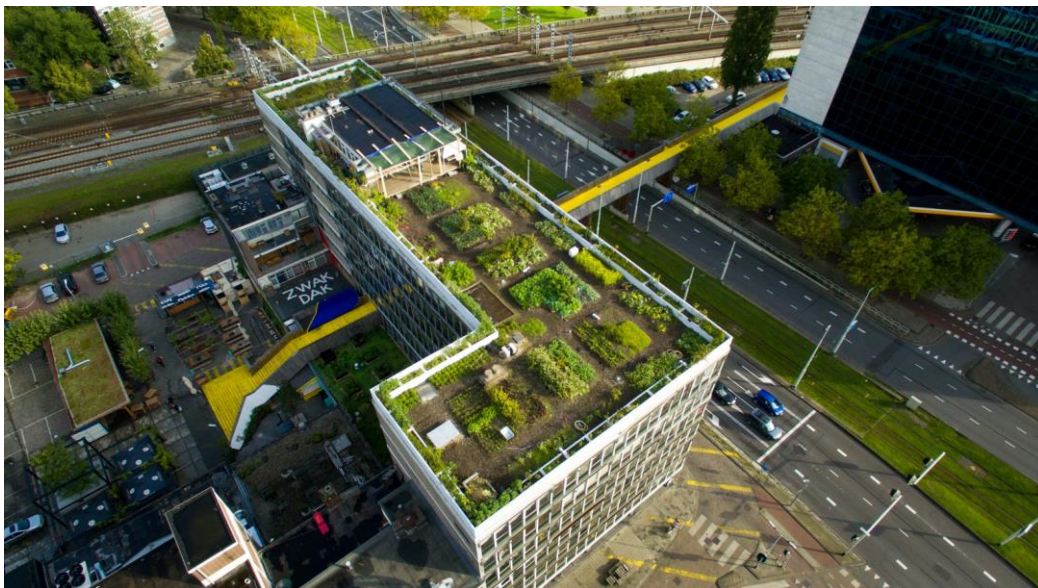


Fig. 2. Roof Farm "Dakaker" in Rotterdam, experimenting with different forms of production- lightweight substrates, hydropoks and Permaculturi.

• Gary Comer Youth Center Roof Garden is located on the roof of a youth center in Chicago and is used by young people and their teachers for extracurricular activities, fig. 6. The area of the garden is 760 sq. m., of which 540 are processed. For the past year there have been produced over 500 kg of organic food, fig.4.



Fig. 3. Roof garden on "Gary Comer" Youth Center in Chicago.

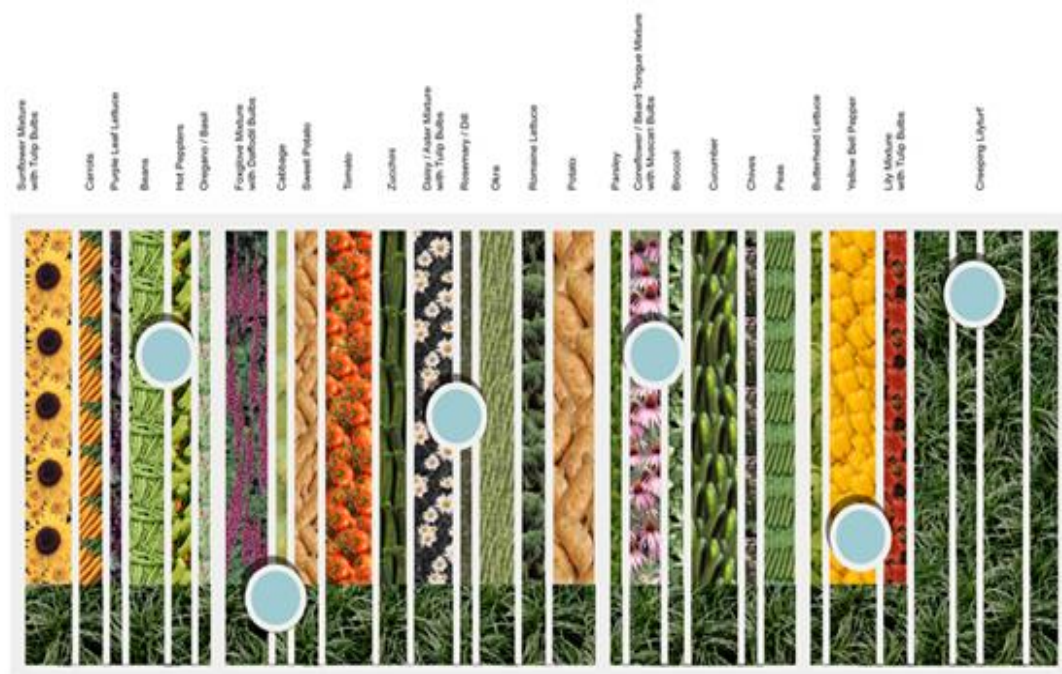


Fig. 4. Distribution of the areas.

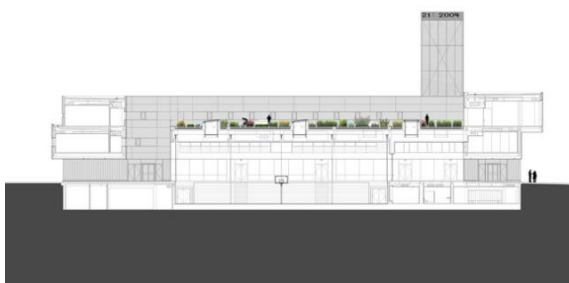


Fig. 5. Vertical location of the garden.



Fig. 6. Post-school activities.

The listed roof farms are a small part of the built around the world. In recent years, besides non-governmental organisations and initiative committees, the business sector has also paid considerable attention to this niche, and a number of urban administrations have prepared regulations and legal frameworks to support this process. As pioneers in this field may be mentioned the city

administrations of Montreal, Vancouver, New York, Paris, Rotterdam, Madrid, etc. The question of the suitability of the produced foods still remains open, but recent studies have shown that the accumulation of heavy metals in plants through their root system and their leaves is within the standard acceptable limits. This favours the location of the roof farms in height, where, unlike traditional urban farming at terrain level, significantly fewer pollutants are deposited.

In Bulgaria, although there is no aggregated information, urban farming has evolved since the second half of the last century (8). Even now in Sofia Municipality is working on the project "Urban agriculture", but it does not reflect the new world trends for the use of the zero areas, and it is mainly limited to mapping of existing areas of decades such as: "Biogarden Vitosha", "Garden for Drujba", "Shared garden German", "Gorublyane Orchard" interblock spaces, etc., as is evident the lack of vision and expertise in the municipal administration. Further obstacle in the development of roof farms are the outdated norms laid down in the Zoning Plan of the City of Sofia (13), as well as the lack of foresight and management capacity in this direction in the administration of the Sofia Municipality, from where unjustified and impractical conditions for construction of roof landscaping are imposed.

REFERENCES

1. NSI: The population of Bulgaria continues to decline and ageing <http://www.bgnes.com/bylgariia/obshchestvo/443760/>
2. Murhov, G. 2019. Architects in the struggle for urban agriculture. <https://stroinfo.com/arhitektite-v-borba-za-gradsko-zemedelie/>
3. Petrova, P., Ivanova, I., Georgiev, G. Sustainable development and governance. Beta - Varna. 2009.
4. Demographia World Urban Areas (Built Up Urban Areas or World Agglomerations). 14th Annual Edition. April 2018.
5. Vandermeulen, Valerie; Verspecht, A.; Vermeire, B.; Van Huylenbroeck, G.; Gellynck, X. (30 November 2011). "The use of economic valuation to create public support for green infrastructure investments in urban areas". *Landscape and Urban Planning*. 103 (2): 198–206.
6. Thomas A. M. Pugh; A. Robert MacKenzie; J. Duncan Whyatt; C. Nicholas Hewitt (2012). "The effectiveness of green infrastructure for improvement of air quality in urban street canyons". *Environmental Science & Technology*. 46 (14): 7692–7699. doi:10.1021/es300826w
7. Mihaylov, T. (2013). "Coordinating design in Architecture". Dissertation work, Sofia, University of Architecture, civil engineering and geodesy.
8. Kovachev, A. The green system of Sofia. Urban aspects., Sofia-Moscow, PENSOFT, 2001 G.
9. Rangelov, C., Mihaylov, T. Landscape Architecture in future cities. IX INTERNATIONAL SCIENTIFIC CONFERENCE ON ARCHITECTURE and CONSTRUCTION ArCivE 2019 31 May-02 June, Varna, Bulgaria.
10. Shahanov, C., G. Tsoleva. 2011. Study of the colorful features of the landscape in order to increase the visual resistance of the landscape and architectural sites. *Management and sustainable development*, 1:121-126.
11. Malkovska, P., Dragozova, E. 2018. ALTERNATIVES FOR DEVELOPMENT IN GREEN INFRASTRUCTURE PROJECTS. *The Journal of International Scientific Publications. Ecology & Safety*, ISSN 1314-7234, Volume 12, 2018, part 341.
12. Asparuhov, C., Rangelov, C., Shahanov, C. 2016. Indoctrination in the preservation of industrial architecture and landscape in Bulgaria. International scientific Conference "BANI" 2016, Higher Construction School "Lyuben Karavelov", Sofia, Bulgaria, 2016.
13. Kuneva TZ., A. Kovachev (2011). The technologies for landscaping of buildings in the context of the normative basis for spatial planning of the Territories in Bulgaria. Collection of reports from the Jubilee Scientific Conference "60 years of Landscape architecture", Sesjani, Sofia, Bulgaria. Page 72-75.